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MEASUREMENTS OF THE CONVERSION LINES OF THE 742 KeV TRANSITION IN THE DECAY OF ^{143}Pm

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The decay scheme of ^{143}Pm is fairly simple [1]. Only one gamma ray with an energy of 741.8 $\pm$ 1.5 keV [2] pertains to the decay. In spite of this only one datum on the α_K internal conversion coefficient in this transition has been published [3] and no measurement is available for the ratio of the coefficients $\alpha_K/\alpha_L + \alpha_M$.

In our measurements the conversion lines were taken with a toroid-sector type beta ray spectrometer [4] which has both a resolution and a transmission of about 3% under the actual experimental conditions. The source was obtained by radiochemical separations of the Pm fraction from Ta, Er and Gd targets irradiated in the Dubna synchrocyclotron. At the time of our measurements the source contained only ^{144}Pm in a considerable quantity, besides ^{143}Pm.

In the determination of the α_K coefficient the data of an earlier work of ours [5] were used in which the gamma spectrum was measured by Ge(Li) techniques with the same source material. From that work the relative intensities of the ^{143}Pm and ^{144}Pm lines are known.

To determine the α_K in question we now measured the relative intensity of the 742 keV-K conversion line of ^{143}Pm and the 695 keV-K line of ^{144}Pm the multipolarity of which is well known [1], [3] (for further details see [6]).

The values of $\alpha_K/\alpha_L + \alpha_M$ from our measurements and according to the ROSE tabulation [6] are given in Tables I and II.

Table I

Theoretical and experimental values of α_K conversion coefficient of 742 keV transition in the decay of ^{143}Pm

Multi-polarity	E1	E2	E3	M1	M2	M3	Experimental value
α_K	$1.45 \cdot 10^{-3}$	$3.74 \cdot 10^{-3}$	$8.49 \cdot 10^{-3}$	$6.07 \cdot 10^{-3}$	$1.63 \cdot 10^{-3}$	$3.72 \cdot 10^{-2}$	$(3.7 \pm 1.3) 10^{-3}$

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Table II

Conversion coefficients' ratio $\alpha_K/\alpha_L + \alpha_M$ for the 742 keV transition in the decay of ^{143}Pm

Multipolarity	E1	E2	E3	M1	M2	M3	Experimental value
$\alpha_K/\alpha_L + \alpha_M$	5,9	5.1	3.9	5.9	5.0	4.4	4.5 ± 0.7

According to these results the most probable multipolarity of the 742 transition of ^{143}Nd is E2 rather than Ml (cf. [3]). Thus, one can suppose a $-3/2$ spin and parity value for the 742 keV excited level of ^{143}Nd which would be a $p_{3/2}$ shell model state.

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